

**COVER**

Millions of books written before the computer era are being digitized for preservation. Because the ink has faded, optical character recognition software cannot decipher many words. Through a repurposing of an existing online security technology called CAPTCHA, these words are being manually transcribed by millions of Web users. See page 1465.

*Photo: Joshua Franzos*

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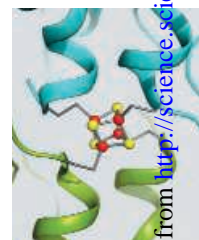
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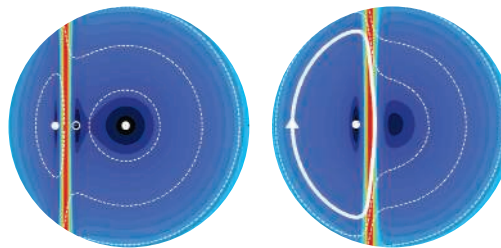
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## SCIENCE EXPRESS

[www.scienceexpress.org](http://www.scienceexpress.org)

### GENETICS

**Species-Specific Transcription in Mice Carrying Human Chromosome 21**  
*M. D. Wilson et al.*

An aneuploid mouse carrying a human chromosome shows that genetic sequence can dominate epigenetic, cellular, and organismal effects in determining transcriptional regulation and gene expression.

10.1126/science.1160930

### CLIMATE CHANGE

**Atmospheric CO<sub>2</sub> and Climate on Millennial Time Scales During the Last Glacial Period**

*J. Ahn and E. J. Brook*

A detailed gas record from the Byrd ice core from 90,000 to 20,000 years ago shows that warming episodes tracked high CO<sub>2</sub> levels in Antarctica but lagged by several thousands of years in Greenland.

10.1126/science.1160832

### APPLIED PHYSICS

**Cavity Optomechanics with a Bose-Einstein Condensate**

*F. Brennecke, S. Ritter, T. Donner, T. Esslinger*

Coupling a Bose-Einstein condensate to an optical cavity holding a few trapped photons provides a sensitive probe of mechanical oscillations in the quantum regime.

10.1126/science.1163218

### CLIMATE CHANGE

**Northern Hemisphere Controls on Tropical Southeast African Climate During the Past 60,000 Years**

*J. E. Tierney et al.*

Abrupt changes in precipitation and temperature resolved in a record spanning the past 60,000 years from Lake Tanganyika, East Africa, are coeval with Northern Hemisphere climate events.

10.1126/science.1160485

## TECHNICAL COMMENT ABSTRACTS

### ECOLOGY

**Comment on "A Global Map of Human Impact on Marine Ecosystems"** 1446

*M. R. Heath*

[full text at www.sciencemag.org/cgi/content/full/321/5895/1446b](http://www.sciencemag.org/cgi/content/full/321/5895/1446b)

**Response to Comment on "A Global Map of Human Impact on Marine Ecosystems"**

*K. A. Selkoe et al.*

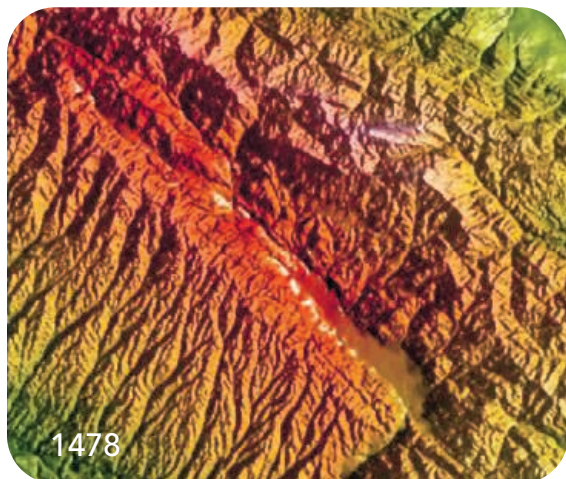
[full text at www.sciencemag.org/cgi/content/full/321/5895/1446c](http://www.sciencemag.org/cgi/content/full/321/5895/1446c)

## REVIEW

### APPLIED PHYSICS

**Cooling, Heating, Generating Power, and Recovering Waste Heat with Thermoelectric Systems** 1457

*L. E. Bell*



## BREVIA

### GENETICS

**A Mutation in Hairless Dogs Implicates *FOXI3* in Ectodermal Development** 1462

*C. Drögemüller et al.*

Mutations in a transcription factor gene involved in ectodermal development cause a lack of hair and abnormal teeth in Chinese Crested, Mexican, and Peruvian hairless dogs.

## REPORTS

### PHYSICS

**Enhanced Sensitivity of Photodetection via Quantum Illumination** 1463

*S. Lloyd*

Quantum-mechanically entangled light, in which one photon is kept as a reference, can exponentially improve the imaging of an object, as compared with unentangled illumination. >> [News story p. 1433](#)

### COMPUTER SCIENCE

**reCAPTCHA: Human-Based Character Recognition via Web Security Measures** 1465

*L. von Ahn et al.*

A security system that relies on the superior performance of humans in comparison to computers in reading distorted text can be harnessed for digitized scanned documents.

### MATERIALS SCIENCE

**A Rubberlike Stretchable Active Matrix Using Elastic Conductors** 1468

*T. Sekitani et al.*

A carbon nanotube-polymer film containing organic transistors and coated with silicon rubber can maintain its electrical properties while being stretched up to 70 percent.

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## REPORTS CONTINUED...

### MATERIALS SCIENCE

#### Imaging of Transient Structures Using Nanosecond in Situ TEM 1472

*J. S. Kim et al.*

Rapidly pulsing electrons through a transmission electron microscope allows imaging of localized cooling and phase separation along a propagating reaction front in a laminate. >> [Science Podcast](#)

### PLANETARY SCIENCE

#### The Magnetic Memory of Titan's Ionized Atmosphere 1475

*C. Bertucci et al.*

Cassini observations show that Saturn's moon Titan retains an imprinted memory of Saturn's magnetic field above its ionosphere, even after passing outside the field.

### GEOPHYSICS

#### Postseismic Relaxation Along the San Andreas Fault at Parkfield from Continuous Seismological Observations 1478

*F. Brenguier et al.*

Correlating 5 years of seismic noise among nearby receivers reveals subtle seismic velocity signals reflecting changes in the properties of the San Andreas fault at Parkfield.

### ATMOSPHERIC SCIENCE

#### Atmospheric Warming and the Amplification of Precipitation Extremes 1481

*R. P. Allan and B. J. Soden*

Satellite data show that in the tropics, heavy rain events have increased in warmer months and decreased in colder months, more than predicted by climate models.

### PALEONTOLOGY

#### Superiority, Competition, and Opportunism in the Evolutionary Radiation of Dinosaurs 1485

*S. L. Brusatte, M. J. Benton, M. Ruta, G. T. Lloyd*

During their early radiation, dinosaur morphology evolved at comparable rates to that of competing archosaurs, implying that opportunity, not superiority, influences their success.

### ECOLOGY

#### Niche Partitioning Increases Resource Exploitation by Diverse Communities 1488

*D. L. Finke and W. E. Snyder*

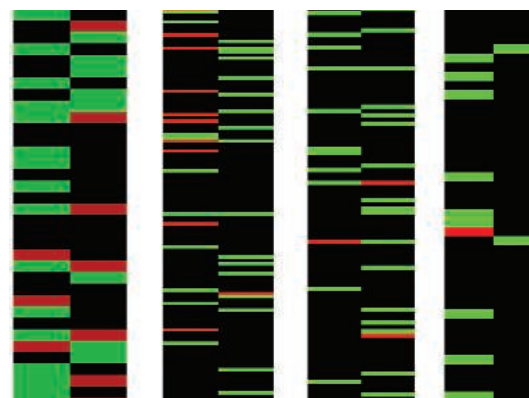
In an ecosystem comprising a parasite, an aphid, and a radish, the use of different resources by each species, not species diversity per se, increases overall consumption.

### MOLECULAR BIOLOGY

#### Degradation of microRNAs by a Family of Exoribonucleases in *Arabidopsis* 1490

*V. Ramachandran and X. Chen*

A class of nucleases specific for short single-stranded RNAs is found to degrade microRNAs in *Arabidopsis*; their mutation results in numerous developmental defects.



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### MEDICINE

#### Activation of Aldehyde Dehydrogenase-2 Reduces Ischemic Damage to the Heart 1493

*C.-H. Chen et al.*

A compound that activates the mitochondrial enzyme aldehyde dehydrogenase-2 reduces the extent of heart damage in a rodent model of heart attack. >> [Science Podcast](#)

### DEVELOPMENTAL BIOLOGY

#### Dual Origin of Tissue-Specific Progenitor Cells in *Drosophila* Tracheal Remodeling 1496

*M. Weaver and M. A. Krasnow*

When fruit flies metamorphose from larvae, a new trachea forms both from undifferentiated cells of the imaginal disc and differentiated cells that re-enter the cell cycle.

>> [Perspective p. 1450](#)

### CELL BIOLOGY

#### FBXW7 Targets mTOR for Degradation and Cooperates with PTEN in Tumor Suppression 1499

*J.-H. Mao et al.*

A tumor suppressor is shown to control the degradation of a central protein regulator of cell proliferation.

### NEUROSCIENCE

#### Unsupervised Natural Experience Rapidly Alters Invariant Object Representation in Visual Cortex 1502

*N. Li and J. J. DiCarlo*

Neurons in the most complex area of the brain's visual cortex can respond to a particular object in any orientation by rapidly learning to associate multiple views of that object.

### CELL BIOLOGY

#### Conformational Switch of Syntaxin-1 Controls Synaptic Vesicle Fusion 1507

*S. H. Gerber et al.*

The synaptic vesicle protein that mediates membrane fusion during exocytosis also regulates the rate and extent of this process by controlling vesicle tethering.



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Homely but hardy.

## SCIENCE NOW

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HIGHLIGHTS FROM OUR DAILY NEWS COVERAGE

### "Water Bears" Survive Earth Orbit

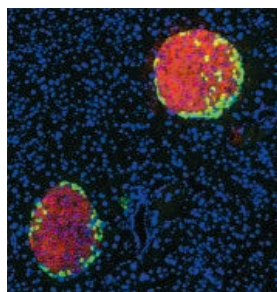
Hardy little creatures shrug off extremes of life outside a spacecraft.

### Finding a Guy Who Looks Like Dear Old Dad

Men and women choose partners who resemble their own parents.

### A Knack for Numbers

Kids who are good at judging relative quantities are also good at math.



Pancreatic islets in p110β mutant mice.

## SCIENCE SIGNALING

[www.sciencesignaling.org](http://www.sciencesignaling.org)

THE SIGNAL TRANSDUCTION KNOWLEDGE ENVIRONMENT

### RESEARCH ARTICLE: Phosphoinositide 3-Kinase p110β Activity—Key Role in Metabolism and Mammary Gland Cancer but Not Development

*E. Ciraolo, M. Iezzi, R. Marone, S. Marengo, C. Curcio, C. Costa, O. Azzolino, C. Gonella, C. Rubinetto, H. Wu, W. Dastrù, E. L. Martin, L. Silengo, F. Altruda, E. Turco, L. Lanzetti, P. Musiani, T. Rückle, C. Rommel, J. M. Backer, G. Forni, M. P. Wymann, E. Hirsch*

The phosphoinositide 3-kinase p110β subunit has noncatalytic functions; its catalytic activity is pertinent to both diabetes and cancer.

### PERSPECTIVE: Smad Signaling Dynamics—Insights from a Parsimonious Model

*H. Shankaran and H. S. Wiley*

Computational modeling of protein localization dynamics yields new information about Smad signaling.

### GLOSSARY

Find out what Kir, Vg1, and YAP mean in the world of cell signaling.



How to deal with journalists.

## SCIENCE CAREERS

[www.sciencereers.org/career\\_development](http://www.sciencereers.org/career_development)

FREE CAREER RESOURCES FOR SCIENTISTS

### Your Research in the Headlines—Dealing With the Media

*E. Pain*

Being prepared can improve the odds that your scientific work is portrayed accurately in the media.

### Team Science and the Diversity Advantage

*C. Rey*

Do scientists with experiences in different cultures have an advantage in an era of team science?

### In Person—Peter Brown, Patent Attorney

*P. Brown*

An award-winning New Zealand scientist tells why he decided to move from the bench to the bar.

### International Grants and Fellowship Index

*GrantsNet Staff*

Learn about the latest funding opportunities from Europe, Asia, and the Americas.

## SCIENCE PODCAST

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**321 (5895)**  
(September 12, 2008)  
*Science* **321** (5895), 1413-1518.

Editor's Summary

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